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WKRP Document No

20010323.162258)

PD Number:

Date Received by Legal

Managing Attorney:

Invention Disclosure status: Awaiting PD Number Awaiting PD Number

General Information | Description of Invention | Invention History | Inventor Information | Witness Information | Additional Information | Administrative Record | Review Record

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General Information

Section Complete

Title: Write a descriptive title of the invention.

One Pass Printing Error Hiding Methods

Abstract: Write a brief abstract of the invention.

This invention describes techniques used to hide nozzle outs in one-pass print modes.

Projects: Select projects associated with disclosed invention.

Products: Select product names or numbers associated with this invention.

Polaris

Description of Invention

Section Complete

Prior Solutions: List prior solutions and their disadvantages.

Multi-pass print modes were used to perform error-hiding of nozzle outs. However, this would decrease throughput. Also, people would not use whole sections of a pen in order to eliminate the use of the nozzle that does not fire. However, this would also significantly reduce throughput and put a greater burden on the nozzles that would remain in use and therefore, reduce pen life.

Problems Solved: Explain the problems solved by the invention.

Method 1: Boost the amount of ink used in adjacent nozzles to the nozzle that is out. Boost the ink usage in adjacent nozzles by the amount of ink that should be printed by the nozzle that is out. Vary the boost between the nozzle above and the nozzle below (i.e. if nozzle 267 is out, boost nozzles 266 and 268). Try to boost empty pixels in the adjacent nozzles before adding to pixels with ink. Do not boost above the maximum level (number of drops) allowed in the file.

Method 2: For the row with a nozzle out match the pixel combination of colors (KCMY or KCMYcm) to the combination of colors that does not include any drops from the plane/pen with the nozzle out that matches closest in L* to the original color.

Advantages: What are the advantages of the invention over what has been done before?

These methods allow the printer to continue printing in a one-pass print mode even though there are nozzle outs that would otherwise negatively affect print quality. Throughput is maintained at a high pace, while print quality is remains high.

https://wkrpwebl.cv.hp.com/cgi-bin/exec.pl

Description: Describe the construction and operation of the invention.

The algorithms would be implemented in the software of the pipeline of the printer. The drop detect on the printer would know which nozzles were out and implement the appropriate algorithm if one-pass printing with error-hiding was requested by the user.

Invention History

Section Complete

Published: Was a description of the invention published, or are you planning to publish? If so, when and in what publications?

Published: No

Announced: Was a product including the invention announced, offered for sale, sold, or is such activity proposed? If so, when and where?

Announced: No

Disclosed: Was the invention disclosed to anyone outside of HP, or will such disclosure occur? If so, when and to whom?

Disclosed: No

Urgency: Will the invention be published, announced, or disclosed in the next 3 months?

No

Described: Was the invention described in a lab book or other record?

Described: Yes

Described Details: Described in Jeff Barr's Lab book

Built: Was the invention built, modeled, or tested? If so, when?

Built: Yes

Date Built:

Government Contract: Was the invention made under a government contract?

If so, the agency and contract number:

Government Contract: No

Inventor Information

Section Complete

Inventor(s): Pursuant to my (our) employment agreement, I (we) submit this disclosure:

Barr, Jeffrey H [00255713]

San Diego, CA, USA

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Heiles, Tod					states [US]
Webb, Steven L			United States [US]		
Rutland, Jeffrey D				United S	tates [US]
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Webb, Steven L					61U250
Rutland, Jeffrey D					61U250
-HP Inventors: Please list the na ntries of citizenship of inventors w	mes, home addre no are not affiliate	sses, telepho d with HP.	one numbers,	, email addre	esses, and

Witness	Information
Section Complete	te

Witnesses: This invention has been explained to and understood by the following witnesses. You must name at least two witnesses.

Bauer, Stephen W [00255218] San Diego, CA, USA

Telnet: 655-8430 Location Code: 111N-5199 steve_w_bauer@am.exch.hp.com Added by Barr, Jeffrey H on

Rutland, Jeffrey D [00256159] San Diego, CA, USA

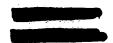
Telnet: 655-7408 Location Code: 111N-5199 jeff_rutland@am.exch.hp.com Added by Barr, Jeffrey H or Witness Dates: At what date was this invention first explained to and understood by each witness?

Witnesses

Date Understood

Bauer, Stephen W

Rutland, Jeffrey D



Additional Information

Section Complete

Electronic Documents: Do you have electronic document files to upload? Please convert your documents into MS Word, PowerPoint, Adobe Acrobat, or plain text format.

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one_pass2.pdf

Size Bytes

420973 358258 Uploaded Date Uploaded By

Barr, Jeffrey H Barr, Jeffrey H

PDF Renditions: Upload PDF renditions of any files that have been attached to this Invention Disclosure.

Paper Documents: Do you have paper documents to include with your Invention Disclosure that you would like to send by FAX?

FAXed Attachments: Attach any paper documents that have been FAXed in to this Invention Disclosure.

Categories: Select WKRP categories where this invention disclosure should be indexed.

General: Printing Methods

Keyword(s): Select keywords to index this invention disclosure.

Error Hiding

Innovation Workshop: Was this Invention Disclosure prepared as a result of an Innovation Workshop? If you are not sure, select No.

No

Related to a Previous Submission: Does this disclosure relate to a previously submitted disclosure? If so, please provide the PD number of the related disclosure and explain.

Related Disclosure: No

Administrative Record

3 Required Fields Remaining

Patent Clerk: Select the name of the Patent Clerk(s) working on this Invention Disclosure:

Isagawa, Michiko [00528430]

[00528430] San Diego, CA, USA Telnet: 655-3341 Location Code: 111N-5129 michiko_isagawa2@am.exch.hp.com Added by Isagawa, Michiko on

PD Number and Legal Received Date: Record the PD number assigned by Merlin and modify the date this disclosure was received, if necessary.

Patent Coordinator(s): Select Patent Coordinator(s) who will work on this Invention Disclosure:

Childers, Winthrop D [00254722]

Šan Diego, CÁ, USA

Telnet: 655-4911 Location Code: 111N-5129 winthrop_childers@am.exch.hp.com Added by Lygas, Ann on Managing Attorney(s): Select Managing Attorney(s) assigned to this Invention Disclosure:

Legal Entity and Site: Select a Legal Entity and Site where this Invention Disclosure will be handled and reviewed:

Legal Entity: IJS

Legal Site: San Diego

Review Record

2 Required Fields Remaining

Assigned Reviewer: Select the name of the Reviewer(s) who will review this disclosure before the Site Review Committee meeting:

Functional Segment: Select the functional segments in which this disclosure will be reviewed:

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10014029 disclosure entitled "One Pass Printing Error Hiding Methods".

Issue: When printing in a one-pass printmode the ability to hide a nozzle out with a different nozzle is hampered because all pixels in a row are always printed with a common nozzle.

If this common nozzle is out there would be no way to hide the nozzle out with current error hiding techniques that depend on multiple passes.

Idea 1: Boost the amount of ink used in adjacent nozzles to the nozzle that is out. Boost the ink usage in adjacent nozzles by the amount of ink that should be printed by the nozzle that is out. Vary the boost between the nozzle above and the nozzle below (i.e. if nozzle 267 is out, boost nozzles 266 and 268, alternately). Try to boost empty pixels before adding to pixels with ink. For example: If pixel pattern of drops for 3 nozzles is with ink level=

266	12 0 0 1 1 2 2 1 2
267	1112210011
268	2010121022

Boost nozzles so pattern looks like:

266	221122222
267	111221,0011
268	2111221022*

*Note: If max level reached do not boost any higher

Benefits:

This allows the printer to continue printing in single=pass print mode even though there are nozzle outs. Throughput is maintained while quality remains high.

Idea 2: Same benefits. For the low with a nozzle out match the pixel combination of colors (KCMY or KCMYom - Spelling?) to the combination of colors that does not include any? From the plane/pen with the nozzle out that is the closest match in L*

For example, if a pixel is made of 1 drop K, 2 drops C, 0 drops M, 2 drops Y, on plain paper in a one pass print mode it's L* average is \sim 50.68. If the cyan nozzle goes out the combination of drops without cyan that is closest in L* would be 1 drop K, 0 drops C, 0 drops M, 1 drop Y on plain paper in a one pass print mode its L* average is \sim 48.59. The L* difference is 209. However, the pixel would no longer need to use the cyan nozzle.

PenHigh_PlainNormal_ImageExperiment

Media: Quality: Siew: Data in: Pen: Cyan, 1 pass, 30 ips, 600 dpi 2 bit/4 Normal Mode Magenta, then Yellow experiment with all 3 bidi levels

Data out:

Pen high r Tod Heiles with different experimental replacement conditions for level 1 at nozzles 50, 60, with different experimental replacement conditions for level 1 at nozzles 50, 60, 150, 160, 170 substitute individually for each pen color to assess the optimum and a separate experiment. the optimum adjacent replacement

Tod Heiles

For missing nozzles on the cyan, magenta, and cyan pens, boost the adjacent rows from 1 drop/pixel to around 1.5 drops Experimentation required to determine level 1 optimum adjacent ink boost for each color Experimentation required to determine if it's better to turn off level 1 for aberrant nozzles Pen f 2 drops_cell600 are used for level2, the pen is already firing at full frequency so adjacent rows can't be modified on the modified on the standard of the standard of the standard of the sufficient headroom exists to reduce level 2 to 1.5-1.8 drops, there might be benefit to boosting adjacent nozzles. high masks for 1 pass printing to specify nozzle replacement for aberrant nozzles modified

To Identify missing nozzles, print the aligned 512 hight stairstep pattern.

```
cyan nozzle 110 is missing:
adjacent cyan nozzles 110 and 111 is missing:
                                                        /-1 Adjacent boost to 1.5 drops
/ remove missing (or leave at 1?)
/+1 Adjacent boost to 1.5 drops
```

/ remove missing (or leave at 1?)
/ remove missing (or leave at 1?)
/+1 Adjacent boost to 2 drops /-1 Adjacent boost to 2 drops

If two adjacent cyan nozzles 110 and 112 is missing with 1 between:

```
/ remove missing (or leave at 1?)
/ 1 between boost to 2 drops
/ remove missing (or leave at 1?)
/+1 Adjacent boost to 1.5 drops
                                                                                                                      l Adjacent boost to 1.5 drops
```

PenHigh_PlainNormal_ImageExperiment

they can be treated as separate groups since the adjacent replacement only extends out 1 nozzle to replace the missing ink, between missing with 2 or are Cyan nozzles 110 and 11 two adjacent

For each missing black nozzle boost level 3 underprinting on the cyan and magenta to full 2 drops per cell_600 fill eliminate level 3 underprinting on the cyan and magenta for adjacent nozzles 2 and 3 away Cut and paste from the following example situations, removing the comments

missing: nozzle 110 If black

and M leve

[(0,1) (0,1)] [(0,1) (0,1)]

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are missing: follows ie if nozzle 110 & 111 replace as If two adjacent missing nozzles are missing If 3 or more are adjacent, insert the same

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+1 Adjacent eliminate underprinti at MISSING K Boost underprinting

mobility mobility mobility

-9. -9.

missing with 1 between, replace are nozzles adiacent missing

If 2 ad Modify

666

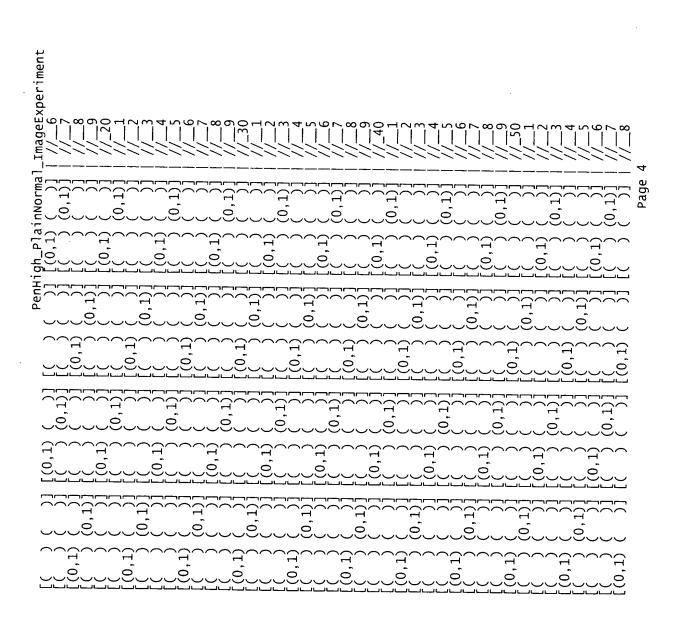
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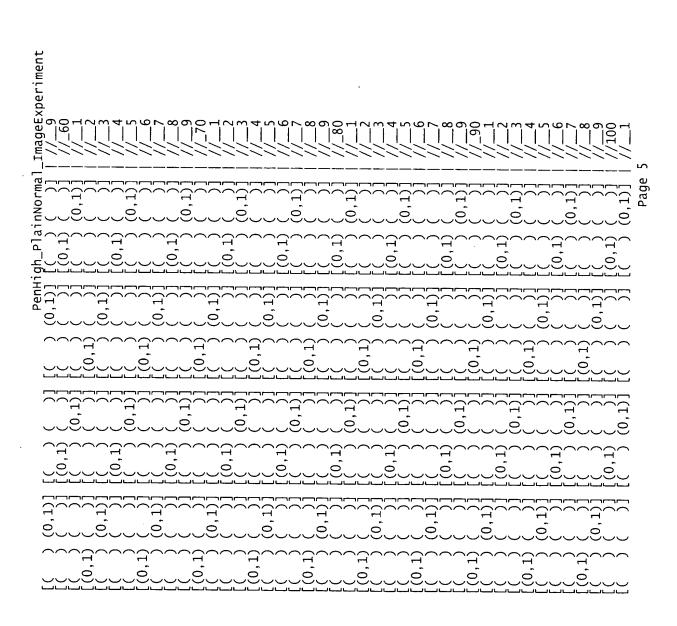
7 Page

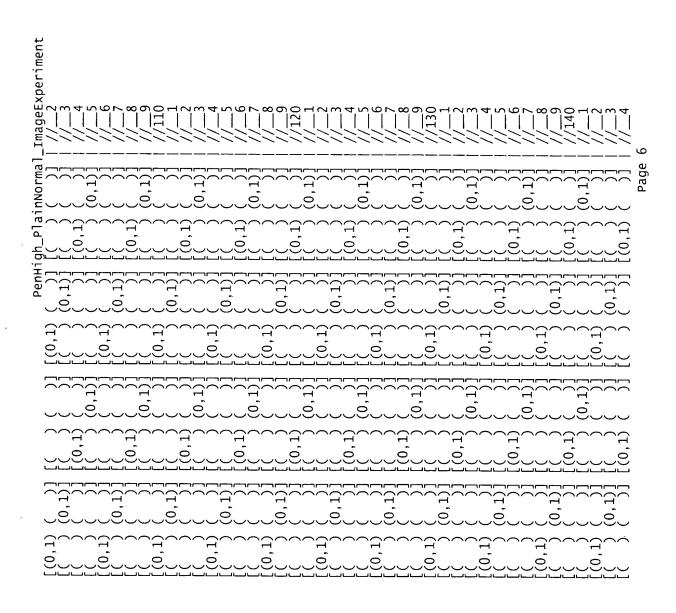
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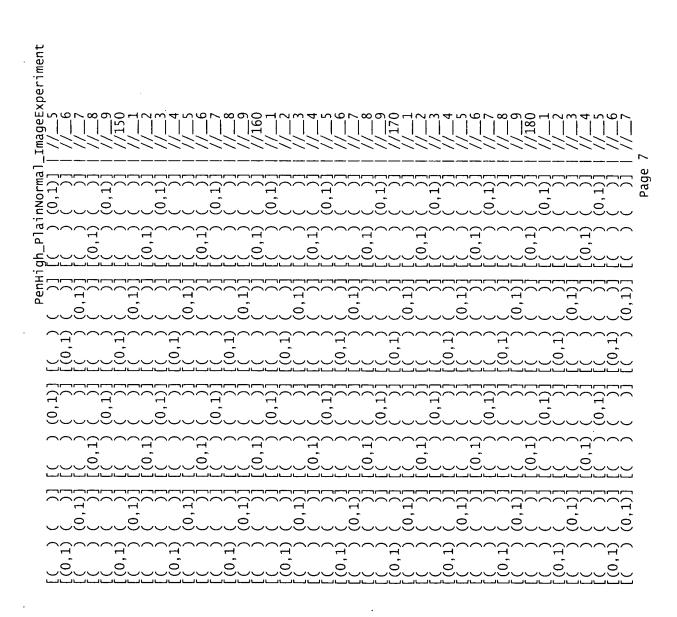
Edit this level to boost underprinting at missing black nozzles, and to control adjacent nozzles. Reserved for underprinting. and cvan Sover under

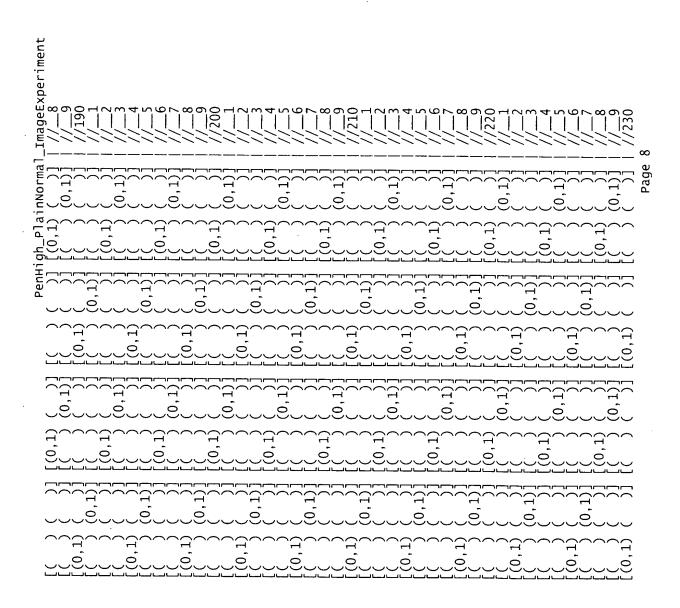
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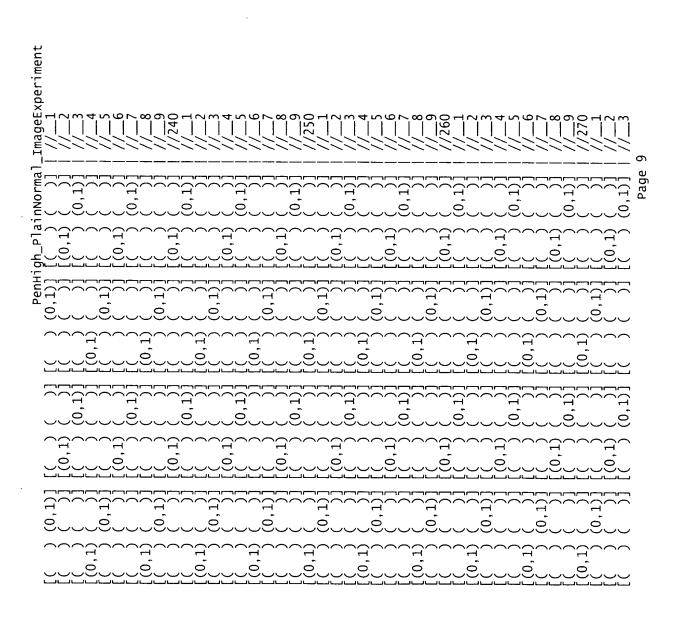


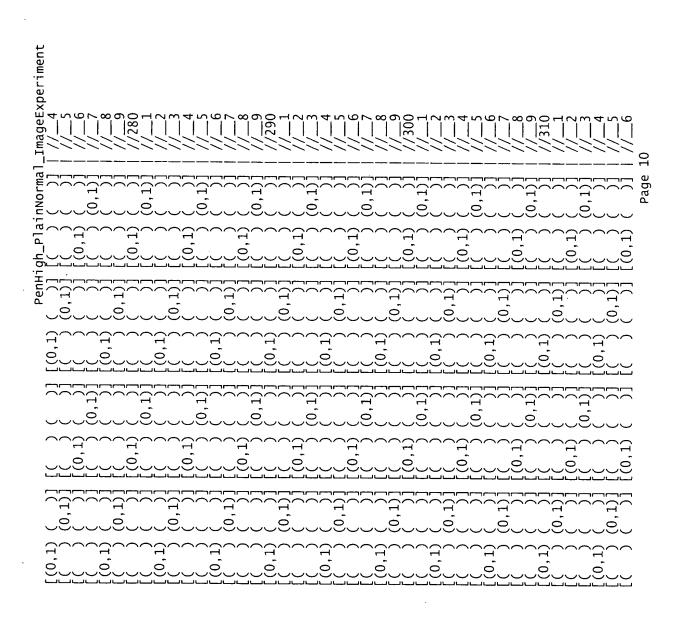


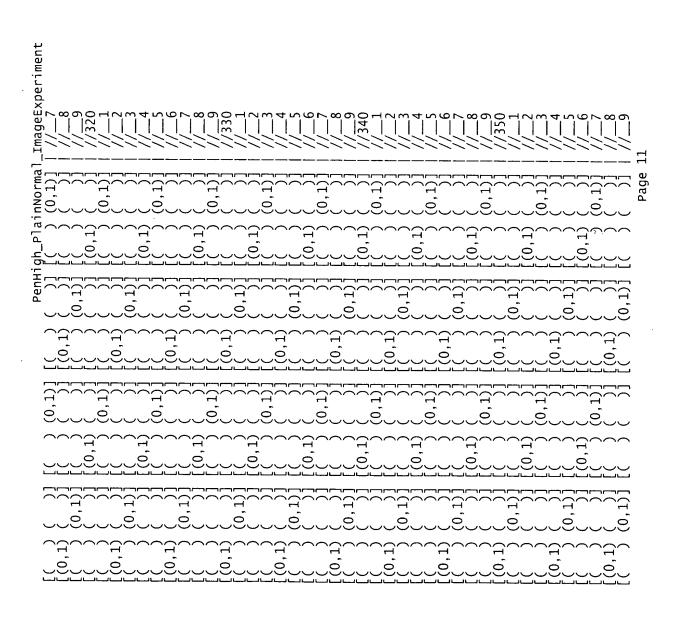


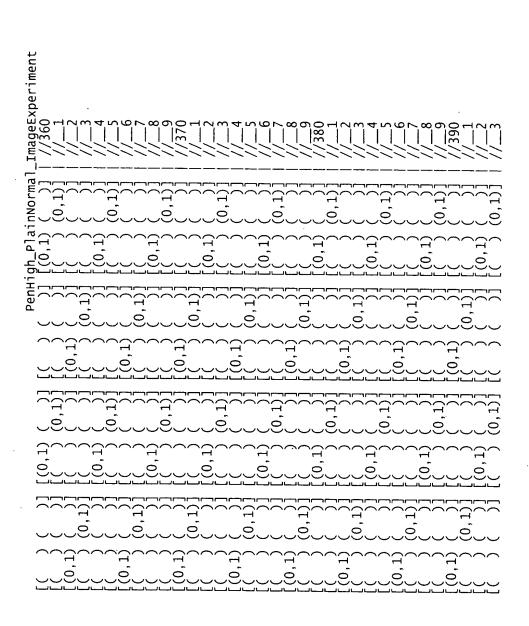












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